CLAIMS

1. Method for equalising and demodulating a data
    signal transmitted via a time-variant channel to a
    receiver,
    characterised in that
    the scatterer coefficients (attenuation, delay and
    Doppler frequency) in the received data signal,
    which cause signal distortion in the channel, are
    measured in the receiver, and that the data signal
    is equalised and then demodulated with them.

2. Method according to claim 1
    characterised in that
    the measurement of the scatterer coefficients and
    the equalisation of the data signal takes place
    within the time domain.

3. Method according to claim 2,
    characterised by
    its use in the context of single-carrier data
    transmission schemes.

4. Method according to claim 2,
    characterised by
    its use in the context of multi-carrier data
    transmission procedures for receiving known data
    sequences (training or synchronisation sequences).

5. Method according to claim 1,
    characterised in that

the measurement of the scatterer coefficients and
the equalisation of the data signal take place
within the frequency domain.

5   6.   Method according to claim 5,
         characterised by
         its use in the context of multi-carrier data
         transmission procedures.

10 7.   Method according to any one of the preceding claims
         characterised in that
         the scatterer coefficients are measured via a
         maximum likelihood criterion.

15 8.   Method according to claim 7,
         characterised in that
         the maximum-likelihood criterion is determined from
         the Euclidian distance between the received signal,
         the scatterer coefficients and the signal data
20   demodulated in the receiver.

    9.   Method according to any one of the preceding
         claims,
         characterised in that
25   a first measurement of the scatterer coefficients
         is implemented with the assistance of a known data
         sequence (training or synchronisation sequence).

    10. Method according to claim 1 to 9,
30   **characterised in that**
         the first measurement of the scatterer coefficients
         is implemented block-wise over an entire data
         sequence.

11.   Method according to any one of the preceding claims 1 to 9,

characterised in that

a Kalman algorithm is used iteratively for the measurement of the scatterer coefficients.

12.   Method according to any one of the preceding claims 1 to 9,

characterised in that

a recursive-least-square algorithm is used iteratively for the measurement of the scatterer coefficient.

13.   Method according to claim 9 or 10,

characterised in that

the scatterer coefficients determined in the first measurement are used for receiving the associated user data, wherein the data are equalised and demodulated block-wise over an entire data sequence, and that the scatterer coefficients measured in the first measurement are corrected with reference to the data equalised and demodulated in this block-wise manner.

14.   Method according to any one of the preceding claims,

characterised in that

the scatterer coefficients determined in the first measurement are used for receiving the associated user data, wherein the scatterer coefficients determined in the first measurement are corrected according to a Kalman or recursive-least-square algorithm with reference to the data equalised and demodulated.

15. Method according to claim 13 or 14,
    characterised in that
    a tree-search procedure is used for correction of
    the scatterer coefficients and for data
    demodulation, wherein, the scatterer coefficients
    and metrics are determined, in each case, for all
    possible data sequences, and those data sequences,
    which provide the best maximum-likelihood-metric,
    are then selected from the tree structure.

16. Method according to claim 15,
    characterised in that
    the scatterer coefficients corresponding to the
    selected best data sequences are used for
    subsequent equalisation and demodulation.

17. Method according to claim 15 or 16,
    characterised in that
    selection of the data sequences is carried out
    block-wise for the entire data sequence observed.

18. Method according to claim 15 to 16,
    characterised in that,
    the data sequences are selected after a
    predetermined pathway depth of the tree has been
    reached.

19. Method according to claim 15 to 18,
    characterised in that
    a metric-first algorithm is used in the tree-search
    procedure.

20. Method according to claim 15 to 18,

characterised in that,

a breadth-first algorithm is used in the tree-search procedure.

5 21. Method according to claim 15 to 18,
characterised in that
a depth-first algorithm is used in the tree-search procedure.

10 22. Method according to claim 15 to 21,
characterised in that
the pathway depth and/or the number of pathways is varied adaptively in the tree-search procedure according to the scatterer coefficients determined.

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23. Method according to any one of claims 15 to 22,
characterised in that
the metric value is also presented in the output of the demodulated data sequence.

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24. Method according to claim 15 to 22,
characterised in that
in addition to the data sequence with the best maximum-likelihood metric, other, next-best data sequences with a next-best-likelihood metric are
25 also presented.

25. Method according to any one of claims 15 to 24,
characterised in that
30 when receiving data signals coded according to a code, exclusively data sequences corresponding to valid code words are included in the tree-search procedure.

26. Method according to claim 25,
characterised in that
in addition to taking the code into consideration,
a Viterbi algorithm or APP algorithm is used in the
5   tree-search procedure.

27. Method according to any one of the preceding claims
characterised in that
the first measurement of scatterer coefficients is
10   implemented exclusively with unknown useful data
sequences, and that default values are used in the
initialisation of the algorithm instead of the
training and synchronisation sequences.

15 28. Method according to any one of claims 7 to 10,
characterised in that
the maximum number of scatterer coefficients to be
included in the algorithms is adapted in each case
on the basis of the scatterer coefficients
20   previously determined.